A new feature in the present number is the extension of the bibliography to microscopical technique and bacteriology.

THE *Journal of Botany* for February, March, and April contains several articles of more than usual interest. Mr. C. R. P. Andrews records the discovery in the Channel Islands of two grasses new to Britain, *Phalaris minor* and *Milium scabrum*, both apparently native; and Mr. Arthur Bennett, the occurrence of *Potamogeton rutilus*, also new to Britain, in Surrey. Dr. A. B. Rendle reviews the British species of *Naias*, now amounting to four (including one found at present in geological deposits only), although the first discovery of the genus as British was as recent as 1850. The very useful review of the algological literature for 1899 will, we hope, be continued in future numbers.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 5.—"Further Note on the Influence of Temperature of Liquid Air on Bacteria." By Allan Macfadyen, M.D., and S. Rowland, M.A. Communicated by Lord Lister, P.R.S.

In a previous communication (*Roy. Soc. Proc.* February 1, 1900) it was shown that no appreciable influence was exerted upon the vital properties of bacteria when exposed for 20 hours to the temperature of liquid air (–183° C. to –192° C.). Further experiments have since been made in which the organisms were again exposed to the temperature of liquid air for a much longer period, viz. seven days.

The organisms employed were *B. typhosus*, *B. coli communis*, *B. diphtheriae*, *B. proteus vulgaris*, *B. acidi lactici*, *B. anthracis* (sporing culture), *Spirillum cholerae asiatica*, *Staphylococcus pyogenes aureus*, *B. phosphorescens*, a Sarcina, a Saccharomyces, and unsterilised milk.

Instead of being exposed as formerly on the actual media in which they were growing, the organisms were submitted to the cooling process in the form of a broth emulsion in hermetically sealed fine quill tubing. This allows of complete immersion, and effects a considerable economy in the amount of liquid air used, besides greatly facilitating manipulation. The liquid air was kindly furnished by Prof. Dewar, and the experiment was conducted in his laboratory.

In the course of the experiment, the loss by evaporation of the liquid air was made up by adding fresh portions from time to time. In this way the temperature of about –190° C. was maintained uninterruptedly through the whole period of the experiment. At the same time considerable care had to be taken in conducting the first cooling, in order to avoid fracture of the quill tubes. A preliminary cooling was therefore effected by means of solid CO_2. After the expiration of a week, the tubes were removed with cork-tipped forceps, and placed in a strong glass vessel till thawing was complete. The tubes were then opened, and the contents transferred to suitable culture media. In each case, a direct microscopical examination was made to detect any possible structural changes.

It is a remarkable fact that, notwithstanding the enormous mechanical strain to which the organisms must have been exposed, a strain far exceeding in amount any capable of being produced hitherto by direct mechanical means, not the slightest structural alteration could be detected.

The sub-cultures made at the conclusion of the experiment grew well, and in no instance could any impairment in the vitality of the organisms be detected. In one or two instances only, growth was slightly delayed, an effect which might have been due to other causes. The photogenic bacteria grew and emitted light, and the samples of milk became curdled.

The above experiments show that bacteria can be cooled down to –190° C. for a period of seven days without any appreciable impairment of their vitality.

It has not yet been possible to undertake the experiments with liquid hydrogen.

Geological Society, April 4.—J. J. H. Teall, F.R.S., President, in the chair.—Additional notes on some eruptive rocks from New Zealand, by Frank Rutley. The author suggests a comparison of certain ancient rhyolites of Great Britain with those of New Zealand affected by solfataric action. As to the causes which may convert a glassy into a lithoidal rhyolite, we still seem to lack information: it is possible that the action of steam may be instrumental in effecting such a change, but this is probably only an occasional agent, and the more general cause of such changes must be sought elsewhere.—On the discovery and occurrence of minerals containing rare elements, by Baron A. E. Nordenskiöld. The first mineral referred to is scheelite, and the next cerite, which contains no less than four rare metals. The incandescent light produced when the latter mineral is fused with charcoal-powder was first observed by Cronstedt in 1751. The discovery of glucina, lithia, selenium and yttria is next referred to. Minerals containing yttria and oxides related to it were, at one time, thought to be almost limited to certain pegmatite-veins running in a broad zone on both sides of the 60th parallel of latitude. Latterly, fluocerite, orthite and gadolinite have been found in Dalecarlia; and among these minerals Benedicks discovered a silicate of yttrium containing 1·5 per cent. of nitrogen and helium. The author discovered kainosite, a silico-carbonate of yttrium and calcium, among minerals from Hitterö; and the same mineral was subsequently discovered in the flucan, fissures, and drusy cavities at the Nordmarken mines. The last-mentioned discovery and others related to it appear to suggest that the mode of formation of fissure-minerals is not so unlike that of the pegmatite-veins of the primary rocks as is generally supposed. Thorium, discovered by Berzelius in 1829, was originally obtained from the rich mineral-locality of Langesund (called Brevig in mineralogical literature), but it has since been recorded from other localities, including Arendal and Finnish Lapland. It is now obtained from the monazite-sand of rivers in the Brazils and South Carolina. Thorite contains about ·5 per cent. of inactive gas, probably a mixture of nitrogen and helium; but the latter element was first obtained from the mineral cleveite, also containing thorium, discovered by the author in 1877. Other minerals bearing nitrogen, argon or helium are referred to; and under the head of minerals bearing tantalum, mention is made of Giesecke's discoveries in Greenland. Among these is fergusonite, one of the richest sources hitherto known for obtaining that mysterious gas, or mixture of gases, which on our planet seems to be almost exclusively confined to minerals containing rare earths. "The group of earths, as well as the group of gases, of which we are here speaking, might, therefore, be compared with certain genera among organic beings, whose species, having not yet fully differentiated, offer to the descriptive zoologist or botanist difficulties analogous to those with which chemists meet in endeavouring to separate the rare earths and rare gases."

PARIS.

Academy of Sciences, April 9.—M. Maurice Lévy in the chair.—Funeral orations on the late M. Joseph Bertrand, delivered by MM. Jules Lemaitre, Maurice Lévy, Berthelot, Gaston Darboux, A. Cornu, Duclaux, Gaston Paris, and Georges Perrot.—On the transmission of the radiation of radium through substances, by M. Henri Becquerel. In order to ascertain whether the rays transmitted through a screen are transformed rays from the radio-active source or secondary rays emitted by the screen, experiments were made on the shadow cast by a body placed on the side of the screen opposite to the source. It appears that part, at least, of the secondary radiation is not deviated in a magnetic field, as is the case with the radiation of radium, whilst another portion is possibly due to partial diffusion. The absorption of the incident radiation increases with the distance of the screen from the source, as has been previously observed.—On the density and analysis of sulphur perfluoride, by MM. H. Moissan and P. Lebeau. The density of the gaseous perfluoride of sulphur, the preparation of which was described in a previous communication, is found to be 5·03, compared with air. The analysis of the compound was effected by decomposing it by the vapour of sodium at a red heat, a mixture of sodium sulphide and fluoride being thus obtained, and also by heating with sulphur or selenium in glass vessels and measuring the volume of the silicon fluoride evolved. The results are in accordance with the formula SF_6, the hexavalent character of sulphur being thus clearly demonstrated.—On the fossil ferns of coal, by M. Grand' Eury. A description of the roots of the various species of ferns occurring in the fossil forests of the coal beds at Saint-Étienne.—Immunity against symptomatic carbuncle after the injection of preventive serum and natural virus, either separately or together. Experiments with sheep show that complete immunity is produced by successive inoculation with serum and virus, but not by the

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injection of a mixture of serum and virus.—M. Michelson was elected corresponding member for the Section of Physics.—Solar observations at the Lyon Observatory during the fourth quarter of the year 1899, by M. J. Guillaume.—On certain equations of Monge-Ampère, by M. J. Clairin.—On the general representation of some analytic functions, by M. Desaints.—New methods for maintaining the vibrations of tuning-forks, by MM. A. and V. Guillet. The electrical mechanism previously applied by A. Guillet to Lippmann's pendulum is perfectly adapted to the tuning-fork.—Experimental study of the movements produced in liquids by heat convection. Permanent control; cellular vortices, by M. Henri Bénard. A preliminary note. The liquid behaves as if divided into a number of regular prismatic cells, the dimensions and periodic movements of which depend on the experimental conditions.—On the duration of the emission of Röntgen rays, by M. Bernard Brunhes. The emission of X-rays produced by a rupture of the primary current of the induction coil lasts for about the ten-thousandth part of a second.—On the reflection and refraction of kathode rays and of the deviable rays of radium, by M. P. Villard. The author's experiments lead to the conclusion that the apparent transmission of kathode rays through metallic plates is due to a secondary emission. The deviable rays of radium behave like kathode rays, whilst the non-deviable rays include radiations of high penetrating power.—Negative electrification of secondary rays produced by means of Röntgen rays, by MM. P. Curie and G. Sagnac. Röntgen rays appear to bear no electric charge, but the secondary rays resulting from their transformation resemble kathode rays in being negatively electrified.—Heat of formation of hydrated and anhydrous strontium dioxide, by M. de Forcrand. The heat evolved in the conversion of strontium monoxide into the anhydrous dioxide is less by about one calorie than that evolved in the formation of barium dioxide, whilst, on the other hand, strontium dioxide has a greater affinity for water than barium dioxide.—On a new method of fractionating some rare earths, by M. Eugène Demarçay. The method is based on the crystallisation from nitric acid of the double nitrates of magnesium and the rare earths.—Formation of monomercurammonium iodide by the action of concentrated ammonia on mercurdiammonium iodide, by M. Maurice François. Monomercurammonium iodide, $NHgH_2I$, is prepared by adding successive small quantities of ammonia to mercurdiammonium iodide; it is a black, crystalline substance which does not become red on exposure to air, and is insoluble in ether.—On a crystalline selenide and oxyselenide of manganese, by M. Fonzes-Diacon. Manganese selenide, MnS, is obtained in cubical crystals by the action of hydrogen selenide on a solution of manganese acetate, by the reduction of manganese selenate with carbon in the electric furnace, and by fusing the precipitated selenide at a high temperature. Prismatic needles of the same substance are produced by the action of hydrogen selenide on manganese chloride at a red heat. A green oxyselenide is formed when manganese selenate is reduced by hydrogen at a bright red heat.—On the reducing action of calcium carbide, by M. Geelmuyden. The action of calcium carbide on boric anhydride at the temperature of the electric furnace results in the formation of calcium boride, CaB_6. Under the same conditions the sulphides of iron, lead, antimony, and magnesium yield calcium sulphide and the respective metals which, except in the case of iron, are volatilised. Aluminium sulphide is not reduced by calcium carbide.—On a new method for the preparation of double sulphates of chromium, by M. C. Pagel. In the destruction of organic matter by means of chlorochromic acid, as previously described, the double sulphates of chromium and sodium or chromium and potassium are formed; they crystallise in the hexagonal system.—Electrolytic estimation of lead in lead sulphate and chromate. Application to the analysis of lead glass and lead chromates, by M. C. Marie. The lead compounds are dissolved in a mixture of nitric acid and ammonium nitrate, and the solution electrolysed in the usual manner.—On $\alpha\alpha\beta$-trimethyl-β-oxyadipic acid, by M. E. E. Blaise. The lactonic acid corresponding with this acid is obtained by the condensation of methyl levulate with methyl bromisobutyrate in presence of zinc.—Action of amyl chloride on calcium carbide, by M. P. Lefebvre. The primary products of the action of amyl chloride on calcium carbide at a dull red heat are probably acetylene, amylene, and calcium chloride.—The nervous ganglions of the posterior roots belonging to the great sympathetic system, by M. Nicholas Alberto Barbieri.

DIARY OF SOCIETIES.

MONDAY, April 23.

Institution of Civil Engineers, at 8.—Eighth "James Forrest" Lecture: The Relations between Electricity and Engineering: Sir William H. Preece, K.C.B., F.R.S.

TUESDAY, April 24.

Royal Institution, at 3.—Studies in British Geography: Dr. H. R. Mill.

Institution of Civil Engineers, at 4.—Repetition of "James Forrest" Lecture by Sir William Preece, K.C.B., F.R.S.——At 8.—Annual General Meeting.

Anthropological Institute, at 8.30—The Ethnography of Torres Straits and British New Guinea: A Genealogical Method of collecting Social and Vital Statistics: Dr. W. H. R. Rivers.—Lantern Demonstration of Native Industries: Prof. A. C. Haddon, F.R.S.

Royal Statistical Society, at 5.—The Consumption of Alcoholic Beverages: H. Bence Jones.

WEDNESDAY, April 25.

Geological Society, at 8.—On Longmyndian Inliers at Old Radnor and Huntley (Gloucestershire): Dr. Charles Callaway.—On a Complete Skeleton of an Anomodont Reptile from the Bunter Sandstone of Riechen, near Basel, giving New Evidence of the Relation of the Anomodontia to the Monotremata: Prof. H. G. Seeley, F.R.S.

THURSDAY, April 26.

Royal Institution, at 3.—A Century of Chemistry in the Royal Institution: Prof. J. Dewar, F.R.S.

Institution of Electrical Engineers, at 8.—The Electric Transmission of Power: Prof. George Forbes, F.R.S.

Institution of Mechanical Engineers, at 8.—Road Locomotion: Prof. Hele-Shaw, F.R.S.

FRIDAY, April 27.

Royal Institution, at 9.—Nineteenth Century Clouds over the Dynamical Theory of Heat and Light: Lord Kelvin, G.C.V.O., F.R.S.

Physical Society (Solar Physics Observatory, Exhibition Road, South Kensington), at 8.—A short account of the Physical Problems now being investigated at the Solar Physics Observatory; and their Astronomical Applications: Sir Norman Lockyer, K.C.B., F.R.S.—Weather permitting, the 36-inch, 10-inch, and 9-inch telescopes will be used for the observation and photography of celestial objects and their spectra. The Apps-Spottiswoode coil and 21-ft. Rowland grating will also be in operation.

SATURDAY, April 28.

Royal Institution, at 3.—Egypt in the Middle Ages: Prof. Stanley Lane-Poole.

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